

REPORT BY  
THE OFFICE OF THE SECRETARY OF DEFENSE  
STUDY TEAM

TO THE  
SECRETARY OF DEFENSE

REASSESSMENT  
OF  
DEFENSE AGENCIES  
AND  
DOD FIELD ACTIVITIES

By Direction of the  
Goldwater-Nichols  
Department of Defense Reorganization Act  
of 1986  
(Public Law 99-433, October 1, 1986)

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Deputy Assistant Secretary of Defense  
(Administration)  
Directorate for Organizational  
and  
Management Planning  
The Pentagon  
Washington, D.C. 20301

## Appendix H

### DEFENSE MAPPING AGENCY (DMA)

#### I. SUMMARY OF RECOMMENDATIONS

##### Mission and Oversight

1. That the Defense Mapping Agency (DMA) continue to perform the DoD Mapping Charting and Geodesy (MC&G) production mission.
2. That oversight is properly placed with policy provided by the Under Secretary of Defense (Acquisition) [USD(A)] and operational advice from the Chairman, Joint Chiefs of Staff (CJCS); but it should be improved. Both the Office of the Secretary of Defense (OSD) and the Organization of the Joint Chiefs of Staff (OJCS) should review the requirements versus resources -- manpower, money, and collection -- gap and initiate corrective action as appropriate.
3. That the Director of DMA be given the authority to fulfill the expanded mission outlined for Combat Support Agencies in the Defense Reorganization Act. Combat Support Agency Directors should participate more fully in the DoD Planning, Programming and Budgeting System (PPBS) process for all matters affecting their mission area.
4. That OJCS revise its requirements priority system to allow DMA to reform its programming for, and execution of, MC&G production to satisfy requirements more in line with operational priorities.
5. That OSD and the Military Departments codify the 1985 Program Decision Memorandum directing the Military Departments to identify and fund, with development proposals, the new, unique MC&G requirements for weapons and systems. Further, the Military Departments and Assistant Secretary of Defense (Command, Control, Communications, and Intelligence) [ASD(C<sup>3</sup>I)], and weapon system developers must improve coordination with DMA.
6. That systematic, comprehensive reviews of DoD MC&G plans, programs, and budgets be performed annually. Further, OSD and OJCS should ensure that intelligence, hydrographic, and bathymetric collection is addressed during these reviews.

##### Readiness and Responsiveness

1. That OSD and OJCS monitor carefully the requirements versus resources gap, and ensure that all appropriate corrective action is taken to reduce it.
2. That zero-based operational, development, and war reserve requirements reviews be conducted regularly to determine the minimum essential data content, resolution, and accuracy needed

for MC&G products. These reviews should be strongly supported to ensure that only essential requirements are being stated.

3. That OSD, OJCS, Navy, and DMA thoroughly analyze requirements for bathymetric collection. OSD and OJCS should fund the minimum level of collection required to satisfy them. Further, DMA should continue to pursue technological advances in bathymetric collection.

4. That DMA's production system replacement -- the Exploitation Modernization Program -- continue on schedule to accommodate mandatory source changes.

5. That the MC&G distribution system be modified. Communications connectivity must be assured and automation should be used to the maximum extent possible.

6. That DMA and the Military Departments correct doctrinal deficiencies for both operational use and logistical concepts. This action should include terms of reference for war reserve stocks. The U&S Commands should incorporate MC&G products into their Time-Phased Force and Deployment Data.

7. That DMA's already extensive participation in both OJCS and U&S Command exercises be extended to test crisis and wartime responsiveness and flexibility.

#### Organization

1. That, for the near term, DMA's organization be left essentially in its present form. DMA should determine and implement, as early as possible, the organizational changes available as segments of the Exploitation Modernization Program become operational.

2. That DMA improve communication and coordination with its users relative to requirements and user priorities.

3. That DMA continue its planning efforts to ensure it can transition rapidly and smoothly to wartime operations.

#### Functions

That the geodetic and geophysical data collection program be reviewed to determine the most efficient and effective course of action. The review should be performed by DMA and coordinated with the Military Departments. The results of this review should be provided to CJCS and ASD(C<sup>3</sup>I) for action. The Geodetic Survey Squadron should remain in DMA pending the results of this review.

#### Efficiency, Economy, and Effectiveness

That DMA continue its Military Department research and development staff and command liaison programs as well as the Effectiveness/Productivity Program.

## Manpower and Budget

1. That DMA not be reduced by manpower reductions identified in Title VI of the Goldwater-Nichols Act.
2. That requirements and budget considerations drive future DMA manpower authorizations.
3. That the Assistant Secretary of Defense (Force Management and Personnel) and the CJCS review the Combat Support Agency military manpower billets against Joint Duty Assignment Criteria and, where appropriate, designate billets as joint duty assignment positions.

## II. HISTORY

In November 1971, President Nixon signed an Executive Order directing the establishment of the Defense Mapping Agency effective January 1, 1972. DoD was directed to combine the three Military Department mapping organizations under arrangements that provided for optimum efficiency and economy in production without impairing legitimate requirements of the separate Military Departments. Resources and personnel were transferred from the Army, Navy, Air Force, and DIA to form DMA. The Agency became operational July 1, 1972. The reporting chain was through JCS to the Secretary of Defense.

Further realignment took place in 1978 when the Agency's Hydrographic Center was moved from its site in Suitland, Maryland and combined with the Topographic Center in Brookmont, Maryland. The new Hydrographic/Topographic Center (HTC) had more flexibility to respond to changes in requirements, priorities, and technology. It could balance production between hydrographic and topographic programs and use common data bases and production technology. This move, while retaining the separate visibility of hydrographic and topographic programs, resulted in improved responsiveness to the Military Departments, increased production effectiveness, and lowered production costs.

The Office of Distribution Services -- now named the Combat Support Center -- was created concurrent with formation of the HTC. It centralized management over DMA distribution activities that had been managed along separate product lines by each of the DMA production centers. The consolidation of distribution activities provided considerable dollar savings and improved efficiency significantly.

The DMA Special Program Office for Exploitation Modernization was established as a result of a 1982 study conducted to determine the future of MC&G technology as it related to the DMA mission. It was chartered to develop and implement, by the early 1990s, a new generation of advanced technology production systems specifically designed to use digital image source material. The resulting Exploitation Modernization Program (EMP) was directed by OSD and endorsed by the Congress.

### III. MISSION, OVERSIGHT, AND ADDITIONAL LEGISLATION

#### Mission

In accordance with its charter, DoD Directive 5105.40, DMA's mission is to provide Mapping, Charting, and Geodetic (MC&G) support and services to the Secretary of Defense, CJCS, the Military Departments, and other DoD Components through the production and worldwide distribution of maps, charts, precise positioning data, and digital data for strategic and tactical military operations and weapon systems. This includes land, sea, and air navigation products and other products that become an integral part of strategic and tactical weapon systems. The Director of DMA is the program manager and coordinator for all DoD MC&G resources and activities. Further, DMA carries out statutory responsibility to provide nautical charts and marine navigation data for the use of all U.S. vessels and aircraft.

#### Mission Alignment Alternatives

Although alternatives to DMA performing the MC&G production mission were considered, none are recommended. Most interviewees noted that the consolidation of Military Department MC&G production activities into a separate DoD Agency resulted in significant dollar savings and improved efficiency. All alternatives considered -- disestablishing the Agency and returning assets to the Military Departments, making one of the Military Departments executive agent, selectively moving MC&G production responsibility to one or more Military Departments -- proved too costly to be considered viable.

#### Oversight

DMA is a separate agency of DoD under the direction, authority, and control of USD(A). Staff supervision is provided by ASD(C<sup>3</sup>I) with operational advice from CJCS.

Established oversight mechanisms exist and work effectively. However, significant problems exist that impede DMA's mission performance. Greater OSD and OJCS support is required to ensure that adequate resources, money, manpower, and collection, exist to fulfill mission requirements.

Most interviewees agreed that the OJCS MC&G requirements priority system, which drives DMA's production schedule, should be revised. The current approach, documented in Annex E of the Joint Strategic Planning Document, differentiates among MC&G priorities, qualifying the importance of each requirement to its related combat operation. The concept is prone to individual interpretation and priority inflation. It defeats the objective of responsive production, that is, satisfying the most urgent requirement first. Currently, almost 60 percent of DMA resources are driven by OJCS priority one -- strategic nuclear forces -- requirements. Over 25 percent are driven by priority two -- theater operational plans -- and 12 percent

support critical aeronautical and marine safety of navigation. This leaves only 3 to 5 percent of DMA resources for the most likely use of DMA products -- crisis and contingency response and low intensity conflict. A proposal that uses operational needs to set priorities has been submitted to OJCS for staffing. Coordination between the Military Departments and DMA on emerging weapon, command and control, and intelligence system MC&G requirements should be improved. Adequate provisions do not exist to identify unique MC&G capabilities required to operate these weapons and systems when each system is first approved for development. Consequently, even major projects may be approved that require unique MC&G support which is not identified until after the projects are complete. Follow-on efforts to meet these requirements waste valuable resources and delay other vitally needed production and management efforts.

The DoD Program Decision Memorandum (PDM) of August 1985 directed the Military Departments to identify and fund "new and unique" MC&G requirements for developmental systems. The Deputy Secretary of Defense subsequently issued guidance, including the requirement for an explicit assessment of MC&G requirements versus DMA capabilities to be submitted at sequential milestones in the systems acquisition review process. Specific instructions, however, have not been published by OSD and the Military Departments have not implemented the PDM guidance.

A systematic, comprehensive planning, programming, and budgeting review of DoD MC&G activities should be initiated. The DMA Director is the Program Manager and coordinator for all DoD MC&G resources and activities. This role allows DMA to review execution of all DoD plans, programs, and policies for MC&G activities not assigned to DMA. It also reviews Military Department programs and fiscal documents related to DoD MC&G matters and recommends appropriate action to OSD. MC&G data collection requirements are established and/or consolidated by DMA and submitted to OSD. OSD, in turn, verifies and sets priorities for collection. DMA establishes DoD MC&G research and development requirements in coordination with OSD, and tasks other DoD Components or commercial contractors. On behalf of OJCS, DMA reviews and validates all departmental and Combatant Command MC&G requirements submissions. However, a more cohesive, comprehensive DoD MC&G program should be developed that considers requirements with resources, collection capability with validated requirements, and MC&G deficiencies with combat readiness.

### Oversight Alternatives

Alternative 1: Change the oversight function so that both operational and policy oversight are provided by CJCS.

This alternative appears to be in consonance with the Goldwater-Nichols Act since DMA is a Combat Support Agency. Additionally, it could improve the link between Combatant Command MC&G requirements and resources. Unfortunately, action to strengthen the link to the commands weakens the link to the weapon and systems

development community. Both links should be strengthened. Moving the oversight to OJCS would create new problems.

Alternative 2: Leave policy oversight in USD(A) with operational advice from CJCS; improve oversight of DMA and the DoD MC&G community.

Placement of DMA oversight appears proper; and, adequate mechanisms exist to exercise it effectively. The current problems relate to exercise of these mechanisms, and whether OJCS and OSD control and identify operational and new development MC&G requirements.

Alternative 3: Leave policy oversight in USD(A) with operational advice from CJCS; improve oversight of DMA and the DoD MC&G community. Provide authority to the Combat Support Agencies to participate more directly in the DoD planning, programming, and budgeting process for all matters concerning their mission area.

This alternative embodies all points in Alternative 2 and provides the Combat Support Agency Directors oversight authority for all DoD programs and plans within their mission areas. These Directors should have increased authority to approve plans for, and ensure interoperability and connectivity among, the wholesale and retail, strategic and tactical, and long haul portions of their combat support mission areas. Direct involvement in the PPBS process is needed to ensure that the Combat Support Agencies are able to perform the increased responsibility they were assigned by the Defense Reorganization Act.

### Conclusions

1. DMA's products and services are critical to successful mission accomplishment.
2. DMA provides products and services common to more than one Military Department. Although some products are unique to a single Military Department, no DMA product line transfer would result in increased efficiency, economy, or effectiveness.
3. Transferring the MC&G production mission to the Military Departments would require significant increases in manpower and other resources.
4. Policy oversight by USD(A) with operational advice from CJCS is the most appropriate oversight mechanism. However, greater OJCS and OSD support is required to ensure that adequate resources -- money, manpower, and collection -- exist to fulfill mission requirements.
5. Changes are needed to ensure that the Combat Support Agencies have sufficient authority to perform the expanded responsibilities they were assigned by the Defense Reorganization Act.
6. The current OJCS MC&G requirements priority system is conducive

to priority inflation, misdirection of production priorities and schedules, and neglect of products required for Third World areas.

7. Coordination between ASD(C<sup>3</sup>I), the Military Departments weapon system developers and DMA is frequently untimely and unsystematic. This situation may result in delays and unsupported systems being fielded with the forces.

8. The Program Decision Memorandum for 1985, directing the Military Departments to identify and fund with development proposals the new, unique MC&G requirements these weapons and systems require, has not been implemented.

9. Systematic, comprehensive planning, programming, and budgeting reviews of DoD MC&G activities should be performed.

### Recommendations

1. That DMA continue to perform the DoD MC&G production mission.

2. That oversight is properly placed with policy provided by the USD(A) with operational advice from CJCS; but it should be improved. Both OSD and OJCS should review the requirements versus resources -- manpower, money, and collection -- gap and initiate corrective action as appropriate.

3. That the Director of DMA be given the authority to fulfill the expanded mission outlined for Combat Support Agencies in the Defense Reorganization Act. Combat Support Agency Directors should participate more fully in the DoD PPBS process for all matters affecting their mission area.

4. That OJCS revise its requirements priority system to allow DMA to reform its programming for, and execution of, MC&G production to satisfy requirements more in line with operational priorities.

5. That OSD and the Military Departments codify the 1985 Program Decision Memorandum directing the Military Departments to identify and fund, with development proposals, the new, unique MC&G requirements for weapons and systems. Further, the Military Departments and ASD(C<sup>3</sup>I), and weapon system developers must improve coordination with DMA.

6. That systematic, comprehensive reviews of DoD MC&G plans, programs, and budgets be performed annually. Further, OSD and OJCS should ensure that intelligence, hydrographic, and bathymetric collection is addressed during these reviews.

## IV. READINESS, RESPONSIVENESS, AND RELATED ADDITIONAL LEGISLATION

### Readiness and Responsiveness

DMA does not have sufficient resources, equipment, or source materials to provide all required products and services. The



requirements priority system skews DMA's ability to be responsive to the Combatant Commanders. Further, DMA has only limited control over the proliferation of developmental weapon and system related MC&G requirements.

DMA's most significant problem is availability of resources versus requirements. Over 25 DoD and non-DoD users submit MC&G Area Requirements Reports to DMA. The gap between available resources and unfilled, validated user requirements currently equates to a \$680 million backlog. No measurable improvement is in sight until the early 1990s. If recent funding trends continue, almost one half of the current backlog will still be unsatisfied at the end of the five year program, ranging from digital products to guide and target strategic nuclear weapons to MC&G products for forces employed in low intensity conflict. Enclosure 2 lists the major MC&G products and services addressed in the Area Requirements submission.

Operational requirements continue to grow. Of particular concern are large, inadequately mapped areas susceptible to low intensity conflict in the Third World. New weapons and systems continue to be approved that require tailored navigational and targeting data. Command, control, and intelligence systems are being fielded that require large quantities of aeronautic, topographic, and hydrographic data.

DMA is trying to discipline the requirements process by directing zero-based reviews. In the past, the large volume users of DMA products -- namely, the Unified and Specified (U&S) Commands and the Intelligence Community -- submitted all the requirements they considered valid. Existing shortfalls demand that requirements be scrubbed and reduced to minimum essential needs. DMA needs OSD and OJCS support to ensure that these reviews are performed.

To counteract source material deficiencies, DMA has taken steps to use available source materials and obtain new materials through international agreements. On a limited basis, the Agency uses commercial satellite photography such as LANDSAT and SPOT. Approximately one fourth of the maps, charts, and digital data provided to the Combatant Commands are provided through international agreements with about 200 mapping agencies in 83 countries.

DMA's production system is a major contributor to its readiness and responsiveness deficiencies. Current production system capabilities evolved as technology advanced and were installed incrementally as resources became available. Current production methods are dispersed among various subsystems; many are labor intensive. The flow of products through the production pipeline is affected by bottlenecks and by intermediate transformations among paper, film, digital, and lithographic media. Some component processes are digital and, while they accrue economies, production cycle times are lengthy. Topographic maps, for example, require about 18 months from raw data to the finished sheet in the cupola of the tank, where they are indispensable. Similarly, the MC&G support

for a cruise missile mission package normally takes a year and a half to create.

A change in national level imagery forced DMA into a major technological upgrade -- the Exploitation Modernization Program (EMP). This development, when completed, will significantly improve readiness, responsiveness, and efficiency. The second phase of the development -- the Mark 90 system -- is a full production system replacement that will allow DMA to perform digital or softcopy operations to achieve both a 75 percent reduction in throughput time and a 50 percent decrease in production work hours. It will be completed in 1992.

DMA's readiness and responsiveness is also affected by its distribution system. Although an automated inventory management system was added to the continental U.S. warehouses and the Washington, D.C. facility, many functions are still manual. Direct support to deployed and rapidly deployable forces is also manual. The entire process would benefit from greater use of automated systems; improved communications connectivity between and among DMA elements and the commands; better storage, location, bar coding, and retrieval systems for the warehouses; and less dependence on bulk stock shipment.

DMA's capability to provide distribution support for limited contingency and crisis operations has been tested and is considered satisfactory. Coordination with requesters works well and products are delivered within the required timeframes. During FY 1986, the Center was involved in 30 crisis support actions during which 150 thousand copies of 845 products were delivered. However, the distribution system should be reviewed and modified as required to provide wartime support. Storage and distribution tasks are not clearly allocated among DMA and the Combatant Commands. Wartime distribution seems satisfactory only from the standpoint of getting bulk stocks to transportation points. The weakest link in the wartime distribution system, as demonstrated in OJCS exercises, is the storage and movement of bulk map stocks into the hands of the users. Since the U&S Commands do not incorporate MC&G products into their Time-Phased Force and Deployment Data, this situation is likely to continue.

Some aspects of MC&G doctrine and logistical requirements, such as the terms of reference for war reserve stocks, require review. DMA is working with the Military Departments to correct doctrinal deficiencies, aiming for better standardization. Terms of reference for war reserve stocks of maps and charts required by the Combatant Commands are needed to determine whether the apparent 38 million copy shortfall is real. This shortfall comprises an estimated 17 million maps and charts not yet produced and 21 million existing maps and charts that have not been printed. Such a shortfall can have a significant effect on DMA responsiveness, and ultimately on Combatant Commands mission performance. The war reserve picture is unclear since it does not count stock in DMA storage or held by the commands. It also excludes the large contingency and training

stocks. DMA is assessing the doctrinal issue of war reserve stockage, including these additional stocks which are substantial in some cases.

The war reserve printing shortfall, noted above, is attributed both to the lack of DMA printing capacity and of resources needed to expand this capacity. DMA managers expressed concern that stock levels requested by the commands may not be realistic. DMA is reluctant to commit printing resources before agreement is reached on realistic stock levels.

### Exercise Participation

DMA participates extensively in OJCS command post exercises and supports some 80 other command post and field training exercises annually. This fosters readiness and responsiveness. But typically for exercise support, long lead times are prescribed, so timely reaction is not fully tested. DMA officials believe that some exercise support should be purposely scheduled for rapid reaction to better test and measure the Agency's wartime flexibility and versatility.

### Conclusions

1. Within existing resource constraints, DMA carries out its assigned mission in a responsive manner.
2. A major \$680 million shortfall exists in unsatisfied requirements. DMA will not be able to satisfy more than half of the users' critical requirements between now and the early 1990s. New weapons and systems currently under development may further extend that date.
3. The requirements gap affects combat readiness for operations in many areas, especially with respect to contingencies and crises in the Third World where low intensity conflict is most probable.
4. Requirements continue to grow for standard products as well as for newly developed systems.
5. MC&G requirements historically have been unconstrained. Priorities for both operational requirements and war reserve quantities are subject to inflation. DMA is undertaking several initiatives to combat this unconstrained requirements growth.
6. Source data are deficient in quality and quantity. This situation is expected to persist. DMA has taken steps to find alternative source materials. Additionally, an acquisition deficiency continues in bathymetry. DMA does not control this collection program and cannot directly influence its budget.
7. DMA's production system is a major contributor to its readiness and responsiveness deficiencies. The system is labor intensive, slow, and cumbersome. It was designed to use a primary collection source that is no longer operational. Total production cycle

times are lengthy. Limited crisis support is adequate when needs can be met with previously produced or processed resources, but procedures are too slow to support crises with new products.

8. The wartime distribution system requires modification. It is insufficiently automated and lacks survivability. Interoperability between depots and combat support elements is hampered by the slowness of bulk hardcopy handling, transporting, and rehandling, and cannot be depended upon to deliver products efficiently.

9. Storage and distribution tasks are not clearly allocated among DMA and the operational commands. This may result in poor coordination, inadequate communications, depleted theater assets, and degraded combat readiness.

10. MC&G doctrine lacks clarity and standardization. Since the U&S Commands do not incorporate MC&G products into their Time-Phased Force and Deployment Data, this situation is likely to continue.

11. DMA participation in OJCS command post exercises is improving. Its support of command post and field training exercises is substantial, although current practice does not completely test DMA crisis and wartime responsiveness.

#### Recommendations

1. That OSD and OJCS monitor carefully the requirements versus resources gap and ensure that all appropriate corrective action is taken to reduce it.

2. That zero-based operational, development, and war reserve requirements reviews be conducted regularly to determine the minimum essential data content, resolution, and accuracy needed for MC&G products. These reviews should be strongly supported to ensure that only essential requirements are being stated.

3. That OSD, OJCS, Navy, and DMA thoroughly analyze requirements for bathymetric collection. OSD and OJCS should fund the minimum level of collection required to satisfy them. Further, DMA should continue to pursue technological advances in bathymetric collection.

4. That DMA's production system replacement -- the Exploitation Modernization Program -- continue on schedule to accommodate mandatory source changes.

5. That the MC&G distribution system be modified. Communications connectivity must be assured and automation should be used to the maximum extent possible.

6. That DMA and the Military Departments correct doctrinal deficiencies for both operational use and logistical concepts. This action should include terms of reference for war reserve stocks. The U&S Commands should incorporate MC&G products into

their Time-Phased Force and Deployment Data.

7. That DMA's already extensive participation in both OJCS and U&S Command exercises be extended to test crisis and wartime responsiveness and flexibility.

## V. ORGANIZATION, FUNCTIONS, EFFICIENCY, ECONOMY, AND EFFECTIVENESS

### Organization

DMA's organization, displayed at enclosure 1, consists of a headquarters element and seven components as follows:

- Headquarters DMA, located in Washington, D.C.
- The Aerospace Center (AC), one of DMA's two principal production facilities, consisting of a base plant located in St. Louis, Missouri and a field office located in Kansas City, Missouri.
- The Hydrographic/Topographic Center (HTC), the other principal production facility, consisting of a base plant located in Brookmont, Maryland; two field offices located in Louisville, Kentucky and San Antonio, Texas; and a Geodetic Survey Squadron based at F.E. Warren AFB near Cheyenne, Wyoming.
- The DMA Systems Center located in Tysons Corner, Virginia.
- The Combat Support Center consisting of a headquarters located in Brookmont, Maryland, distribution centers in Pennsylvania and Utah, in-theater distribution centers located in Germany and Hawaii, and ten smaller centers located around the world.
- The Defense Mapping School located at Ft. Belvoir, Virginia.
- The Office of Telecommunications Service located in Reston, Virginia.
- The Inter-American Geodetic Survey (IAGS) responsible for cooperative mapping and charting agreements conducted jointly between the U.S. and national mapping agencies in Latin American countries. Its headquarters is located in San Antonio, Texas. IAGS operates a cartographic training school in the Panama Canal area to assist Latin American cartographic agencies in the training of production personnel. IAGS also has field project offices in 15 Latin American countries, including Panama, to provide on-site technical assistance. These countries, in turn, produce MC&G products in accordance with agreed upon specifications that satisfy DoD requirements.

Organizational changes should be explored to improve coordination with users. Interviewees suggested that they need to deal with too many different DMA organizations to get questions answered and problems resolved. MC&G staff officers in the commands are required to talk to different points of contact in DMA headquarters

and its operating components. Communication with users relative to required products and their priorities should be channeled through a single DMA office.

DMA has the organizational capability to convert to wartime operation; however, at present, this conversion is not likely to take place as smoothly and quickly as would be required. DMA's Combat Support Plan, when fully implemented, will fill significant voids in DMA's wartime preparedness.

### Conclusions

1. The present peacetime organizational structure is satisfactory for existing operations and capabilities, but may be unsuitable for changing needs in the future.
2. For the near term, no viable alternative to DMA's current organization exists, but organizational dysfunctions causing communications difficulties for users should be corrected. Implementation of the Exploitation Modernization Program (EMP) will permit DMA to restructure its organization to take advantage of the many potential benefits the EMP should provide.
3. DMA has the organizational capability to transition to wartime operations; however this conversion is not likely to take place as smoothly or quickly as may be required.

### Recommendations

1. That, for the near term, DMA's organization be left essentially in its present form. DMA should determine and implement, as early as possible, the organizational changes available as segments of the Exploitation Modernization Program become operational.
2. That DMA improve communication and coordination with its users relative to requirements and user priorities.
3. That DMA continue its planning efforts to ensure it can transition rapidly and smoothly to wartime operations.

### Functions

DMA's functions are:

- Providing timely support of the validated, global needs of the Armed Forces for MC&G products, data, and services.
- Performing program management and coordination functions for all DoD MC&G resources and activities.
- On behalf of CJCS, reviewing MC&G requirements both for validity and relative priority and providing a consolidated requirements statement.

-- Providing staff advice and assistance on MC&G matters to OSD, the Military Departments, OJCS, other DoD Components, and other Government Agencies, as appropriate.

-- In coordination with the Under Secretary of Defense for Policy, establishing policies and providing DoD participation in national and international MC&G activities. DMA executes DoD responsibilities under interagency and international MC&G agreements.

-- Establishing and/or consolidating MC&G data collection requirements and providing them to ASD(C<sup>3</sup>I). OSD is responsible for verifying and setting priorities for these collection requirements. DMA collects or tasks other DoD components to collect or provide necessary data.

-- Establishing MC&G RDT&E requirements in coordination with USD(A). DMA tasks the Military Departments or private contractors to accomplish these requirements.

Major shifts in Geodetic and Geophysical (G&G) program requirements are taking place and could result in the need to realign functions and organizations involved in data collection and processing. The Navy's TRIDENT program originally projected an extensive need for gravity data, but these requirements will be reduced significantly through FY 90, to be activated again in FY 91. A DMA core capability -- workforce and skills -- for collecting and processing gravity data must be maintained during the interim period. In addition, decisions in the small ICBM and RAIL PEACEKEEPER programs have the potential to add extensive new requirements for gravity data.

The Geodetic Survey Squadron (GSS) mission is central to DMA's G&G program. Certain tasks currently assigned under that mission should be reviewed. Included are precise geodetic surveys to support national missile test ranges and inertial navigation system (INS) positioning surveys on airfields to support Strategic Air Command and the combatant commands' tactical air forces. Many of these surveys are accomplished by uniformed Air Force surveyors assigned to DMA's GSS. The high order INS surveys will need to be continued in wartime, including the possibility for operations in hostile areas. This mission may best be accomplished by theater operational forces. Survey support to the national missile ranges should also be reviewed to determine if certain functions are appropriate for the DMA GSS.

### Conclusions

1. DMA functions are appropriate to performance of its mission.
2. Major shifts in geodetic and geophysical program requirements could result in the need to realign functions and organizations involved in data collection and processing.



3. Although Geodetic Survey Squadron (GSS) functions must be performed, the GSS mission and its organizational location requires review.

### Recommendation

That the geodetic and geophysical data collection program be reviewed to determine the most efficient and effective course of action. The review should be performed by DMA and coordinated with the Military Departments. The results of this review should be provided to CJCS and ASD(C<sup>3</sup>I) for action. The Geodetic Survey Squadron should remain in DMA pending the results of this review.

### Efficiency, Economy, and Effectiveness

In 1972, the Agency began an Effectiveness/Productivity Program that has received high marks by GAO and others. Over 500 actions have been implemented with savings or cost avoidances, exceeding \$91 million dollars. In 1986, DMA components submitted over \$10 million in savings to headquarters for validation. Some historical examples are:

- The original consolidation of all DoD MC&G activities under a separate Agency resulted in extensive dollar savings and improved efficiency.

- The 1978 consolidation of the Hydrographic Center and the Topographic Center resulted in \$9.3 million in manpower savings and \$4.7 million in facilities cost savings.

- Refinements to the FIREFINDER digital data requirements saved \$5.5 million.

- Modification of the printing cycles for Flight Information Publications saved \$1.9 million.

- Change in the grade of paper on which maps are printed saved \$1.2 million.

- Consolidation and reorganization of Air Target Material production resulted in 301 military manpower positions being returned to the Air Force.

The Effectiveness/Productivity Program is based on a classical input-output relationship; validated savings are converted to greater service for DMA customers. In 1972, a goal to increase productivity by 10 percent over three years was established. To the end of FY 76, the cumulative increase in productivity was 19 percent.

The shift to new digital product lines in 1977 had an adverse near term effect on productivity, as resources directed to the new digital programs offset other production gains. As a result, DMA's production declined approximately four percent between FY 77



and FY 79. This trend was reversed in FY 80. The cumulative increase since the program began is 32 percent. (See enclosure 3.)

DMA also has other programs to improve efficiency, effectiveness, and economy. A few examples are:

-- DMA representatives were placed on the Military Department research and development staffs to provide early identification and determination of MC&G requirements embedded in weapon, command and control, and intelligence system development efforts.

-- DMA has liaison representatives located at Combatant Command headquarters to help command planners determine their MC&G requirements and ensure they are documented in operational and contingency plans. These representatives currently are located at headquarters elements of the European and Strategic Air Commands. They plan to provide representatives to the Central, Special Operations, and Atlantic Commands by June 1988; and for the Pacific, Transportation, Southern, Space, and Forces Commands by June 1989.

### Conclusions

1. Since its establishment, DMA has continually improved its efficiency, effectiveness, and economy.

2. Within existing resource constraints, DMA operates with efficiency, effectiveness, and economy. It has operated a successful Effectiveness/Productivity Program since 1972 in which over 500 actions have been implemented with savings or cost avoidances exceeding \$91 million. From 1972, when DMA became operational, the cumulative increase in productivity has been 32 percent.

3. DMA is assigning liaison personnel to Military Department research and development staffs to assist in early identification and determination of MC&G requirements embedded in weapon, command and control, and intelligence development efforts.

4. DMA liaison personnel, located at Combatant Command headquarters, help command planners determine their MC&G needs, and ensure these needs are documented in operational and contingency plan annexes. These representatives currently are located at the European and Strategic Air Commands, and will be provided to other U&S Commands by the end of FY 89.

### Recommendation

That DMA continue its Military Department research and development staff and command liaison programs as well as the Effectiveness/Productivity Program.

## VI. BUDGET AND MANPOWER

DMA's FY 86 end strength was 9,782 billets. It represents the

entire U.S. military MC&G production capacity. Requirements have grown exponentially; this growth is expected to continue. Neither dollars nor manpower have kept pace with this growth.

The Defense Reorganization Act reduction would cut 489 billets by end FY 88 and an additional 473 by end FY 89. DMA cannot absorb these reductions and maintain combat readiness.

Between FY 73, the first full year of DMA's operation, and the end of FY 86, manpower shows a net increase of 1,000 billets. During this timeframe, only 71 billets were added specifically to deal with the extensive backlog in requirements. Approximately 2,000 billets have been approved to satisfy new mission requirements, but over half of these were reduced in omnibus cuts. When DMA was created, the U.S. military did not have cruise missiles, and, therefore, did not need digital terrain elevation or feature analysis. Such requirements are increasing with each new weapon developed and each new operational scenario. Adequate manpower does not exist to satisfy current requirements for these extremely labor intensive products.

The U.S. military presence in Third World areas has increased driving requirements for new or updated MC&G products. Adequate mapping and charting products have never existed for these areas. Manpower does not exist to overcome shortfalls to address these requirements. "Lessons learned" from each contingency operation continue to include inadequate MC&G products.

Source material format changes have forced DMA to convert from a conventional to digital imagery processing. The Exploitation Modernization Program (EMP) will allow continued use of this valuable collection source and reduce the time it takes to produce MC&G products. This system has the potential to save considerable manpower when it is completed in the early 1990s.

The Effectiveness/Productivity Program discussed in Section V of this report has produced many notable savings. DMA continues to review its manpower to identify areas for further consolidation and savings. One recent example is the closing of the Providence, Rhode Island facility in FY 87. DMA uses manpower standards to determine manning requirements and also to develop its annual production schedule. They ensure these standards are reviewed rigorously and kept current.

DMA's ability to satisfy command requirements depends largely on manpower, and currently approved assets are not sufficient. Commanders repeatedly have expressed their concern about the deteriorating currency of maps, charts, and digital products being used by their forces. Of the current 118 thousand requirements, only about 53 percent are for products that now exist and about half of these are out of date and inadequate to support fully combat operations. DMA's current backlog equates to 3,800 workyears per year. The proposed reduction would increase the DMA production shortfall to 4,700 workyears per year.

## Joint Duty Assignments

One of the most important contributors to Defense Agency efficiency and effectiveness is the quality of its manpower. The Combat Support Agencies must know what the forces need, understand tactics and doctrine, and must be able to determine when and why requirements are more or less important. The military officers assigned to these agencies must translate these demands into war required capability both in the Defense Agency and at the commands. This translation is critical and depends on quality and well trained military personnel. The features of the Goldwater - Nichols Act prescribed for Joint Duty Assignments should fulfill these requirements.

However, the current allocation of Joint Duty Assignment billets presents a problem. About 50 percent of the Defense Agency military officer billets (O-4 and above) have been designated Joint Duty Assignments. This creates a "have" and "have not" situation that is already affecting morale. Additionally, Defense Agency military are traditionally criticized as being lower in quality than those kept in the Military Departments. The "50 percent rule" will exacerbate this problem because it is unlikely that top quality officers will be assigned to the non-Joint assignments.

## Conclusions

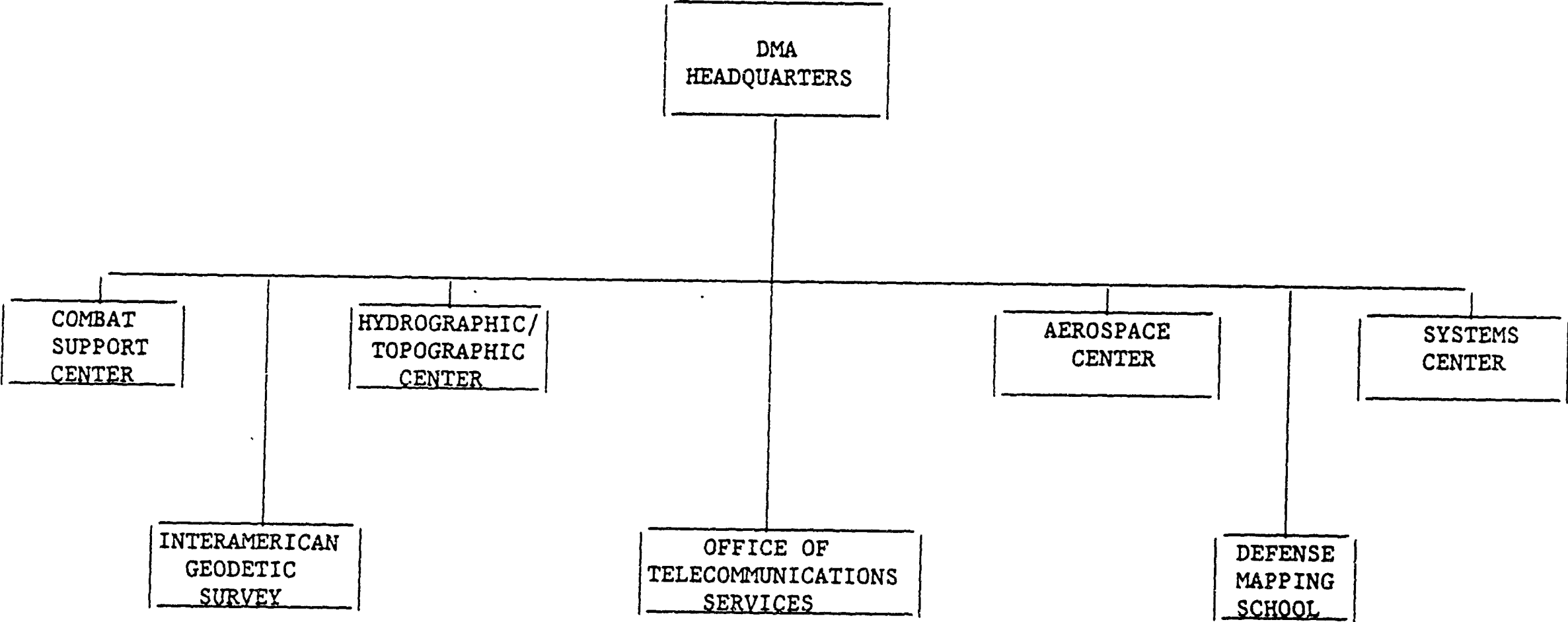
1. DMA's ability to satisfy Combatant Command and Military Department requirements depends on increased manpower. Requirements have grown exponentially, manpower and funds have not kept pace.
2. DMA continues to explore ways to use manpower more productively. The DMA Effectiveness/Productivity Program has identified significant savings over the years and allows these savings to be applied against production shortfalls. The Agency uses work standards to determine general manning requirements and also to develop its production schedule. These standards are reviewed rigorously and kept current.
3. Title VI general manpower reductions would further exacerbate the already significant gap between requirements and resources. This gap translates to potential deficiencies in U.S. force readiness.
4. Added Combat Support Agency responsibilities in the Defense Reorganization Act demand more management, oversight, and dedicated planning support.
5. Combat Support Agencies must provide operational expertise, must know what the forces need, must understand tactics and doctrine, and must be able to determine when and why some requirements are more or less important. The military officers assigned to these agencies play a role in each Agency's ability to translate requirements into operational capability both in the Defense Agency and at the Combatant Commands. This translation demands the quality and training features the Defense Reorganization Act proscribed.

for Joint Duty Assignments.

### Recommendations

1. That the DMA not be reduced by the manpower reductions identified in Title VI of the Goldwater-Nichols Act.
2. That requirements and budget considerations drive future DMA manpower authorizations.
3. That the Assistant Secretary of Defense (Force Management and Personnel) and CJCS review the Combat Support Agency military manpower billets against Joint Duty Assignment criteria and, where appropriate, designate billets as Joint Duty Assignment positions.

DEFENSE MAPPING AGENCY



DEFENSE MAPPING AGENCY  
MAJOR PRODUCT REQUIREMENTS

<u>Products</u>	<u>Items Required</u>	<u>Items Available</u>	<u>KSNM Required</u> *	<u>KSNM Available</u> *
<u>Aeronautical</u>				
Operational Navigation Charts	270	270	108,000	108,000
Tactical Pilotage Charts	773	502	77,918	50,602
Joint Operations Graphics (Air)	6,120	3,805	31,824	19,786
<u>Topographic</u>				
1:50,000 Scale Maps	34,965	18,340	7,725	4,218
1:100,000 Scale Maps	908	426	817	383
Joint Operations Graphics	5,204	3,920	27,061	20,384
City Maps	2,513	1,483	151	90
Terrain Analysis Data Base (Tactical)	4,194	451	965	103
Terrain Analysis Data Bases (Planning)	1,065	409	5,538	2,127
<u>Hydrographic</u>				
Ports/Harbors	3,003	1,801	240	144
Coastal Charts	1,919	1,722	10,362	9,299
Combat Charts	464	296	103	69
Bathymetric Navigation Planning Charts	2,134	278	213,400	27,800
<u>Digital</u>				
Digital Terrain Elevation Data	15,624	9,219	35,202	21,204
Digital Feature Analysis Data	11,697	3,102	27,324	7,135
Firefinder	6,775	3,258	1,558	749

\* Nautical Square Miles in Thousands

Enclosure 2

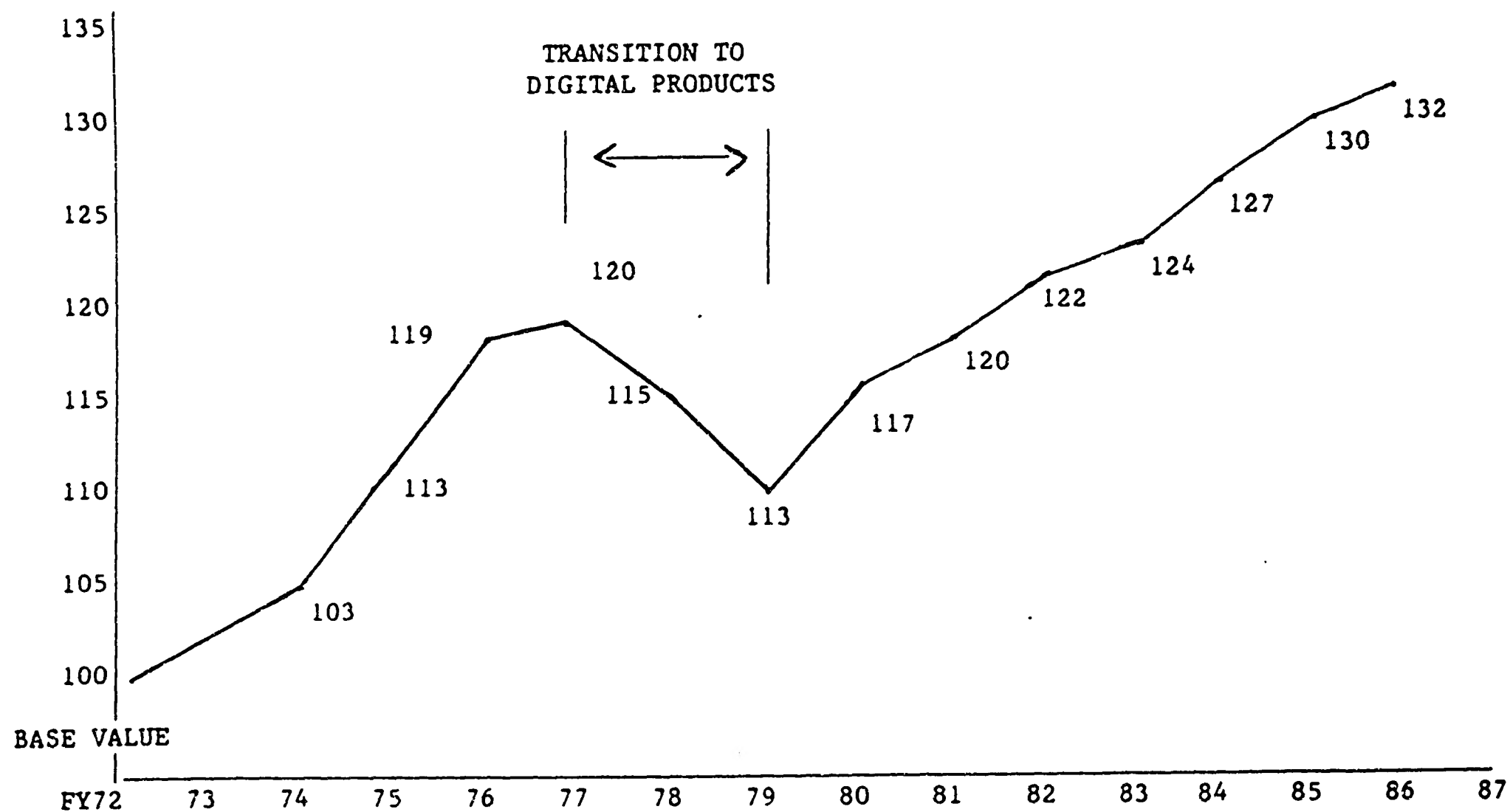
DEFENSE MAPPING AGENCY  
MAJOR PRODUCT REQUIREMENTS

<u>Products</u>	<u>Items Required</u>	<u>Items Available</u>	<u>KSNM Required</u> *	<u>KSNM Available</u> *
	<u>Target Materials</u>			
Air Target Charts - Series 200	3,051	2,853	10,373	9,700
Joint Operations Graphic - Radar	1,036	732	5,387	3,806
Point Positioning Data Bases	8,600	4,177	8,600	4,177
Vertical Obstruction Data	1,193	528	2,744	1,214
Terrain Contour Maps	5,620	4,450	-	-

\* Nautical Square Miles in Thousands

Enclosure 2 (Cont)

# DMA PRODUCTIVITY INDEX





**ARMY**